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Trees of the Eddy Arboretum

A.R. Liddicoet
F.I. Righter

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Miscellaneous Paper 43
January 1960

PACIFIC SOUTHWEST
FOREST AND RANGE
EXPERIMENT STATION

FOREST SERVICE - U. S. DEPARTMENT OF AGRICULTURE

TREES OF THE EDDY ARBORETUM

INSTITUTE OF FOREST GENETICS, PLACERVILLE, CALIFORNIA

By

A. R. Liddicoet, Forestry Aid, and F. I. Righter, Forest Geneticist
Division of Forest Genetics Research

Miscellaneous Paper No. 43

January 1960

U. S. DEPARTMENT OF AGRICULTURE, FOREST SERVICE
PACIFIC SOUTHWEST FOREST AND RANGE EXPERIMENT STATION

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TREES OF THE EDDY ARBORETUM

INSTITUTE OF FOREST GENETICS, PLACERVILLE, CALIFORNIA

By A. R. Liddicoet and F. I. Righter[1/]

Because genetic diversity is the raw-material of breeding, one of the first concerns of the systematic breeder is to assemble at one convenient place as many as possible of the species and varieties of the genus or genera with which he works. Accordingly, the establishment of some 70 to 80 species of pine at Placerville, California was started shortly after the Eddy Tree Breeding Station, now the Institute of Forest Genetics, was founded in 1925. The arboretum which grew from these early efforts was named in honor of the founder, Mr. James G. Eddy.

This arboretum now contains what probably is the most complete collection of pines in the world, including 72 species, 35 varieties, and 90 different hybrids (F_1 interspecific crosses, backcrosses, 3-way hybrids, and progenies arising from interbreeding among members of the same F_1 cross), as well as some artificially-produced polyploid pines and a few specimens of various other genera of forest-trees. As research has so far been restricted to the pines, there has been no systematic planting of other conifers or angiosperms. Altogether, some 16,000 planted trees occupy 55 acres. The collection includes representatives of ponderosa pine from more than 50 sources, from British Columbia to Mexico and from South Dakota to the Pacific coast.

The area is divided into a main arboretum in which the various species are located and contiguous areas on which provenience, progeny, and hybrid tests are underway. In the main arboretum, the trees, mostly 28 to 30 years of age in 1957, are 15 to 20 feet tall for the slow growing species and up to 80 feet for the faster growing species; trees in the provenience, progeny, and hybrid tests are younger. Thus, the Eddy Arboretum serves as a breeding-laboratory and as a place where students, botanists, foresters, visiting scientists, and laymen can observe and study most of the pines and many hybrids.

1/ We are indebted to Dr. J. W. Duffield for suggestions regarding revision of the article and to Dr. N. T. Mirov for critical review and suggestions.

To satisfy the numerous requests of visitors and correspondents for information about the arboretum, "Trees in the Eddy Arboretum" was published in 1947.[2/] Many hybrids and some species have been added to the arboretum since then, and some species have failed. This revision brings the list of trees up-to-date and presents several features not included in the original publication.

The arboretum is located about half way between Sacramento and the summit of the Sierra Nevada at an average elevation of 2,700 feet. It has a south and southwest aspect. The soil is a deep, Aiken clay-loam. Its location puts the arboretum well above the hot Central Valley but below the colder zones of the Sierra Nevada (for climatological data see appendix).

Some pines have failed at the Institute of Forest Genetics:

Pinus aristata Engelm (bristlecone)--trees probably were not taken care of as well as they should have been.

P. cembra L. (Swiss stone)--trees probably were not taken care of as well as they should have been.

P. insularis Endl. (Luzon)--too cold.

P. merkusii Vriese (Tenasserim)--too cold.

P. occidentalis Swartz (West India)--too cold.

P. oocarpa Schiede (eggcone)--does not do well, too cold. (Perhaps Chihuahua strain would do better.)

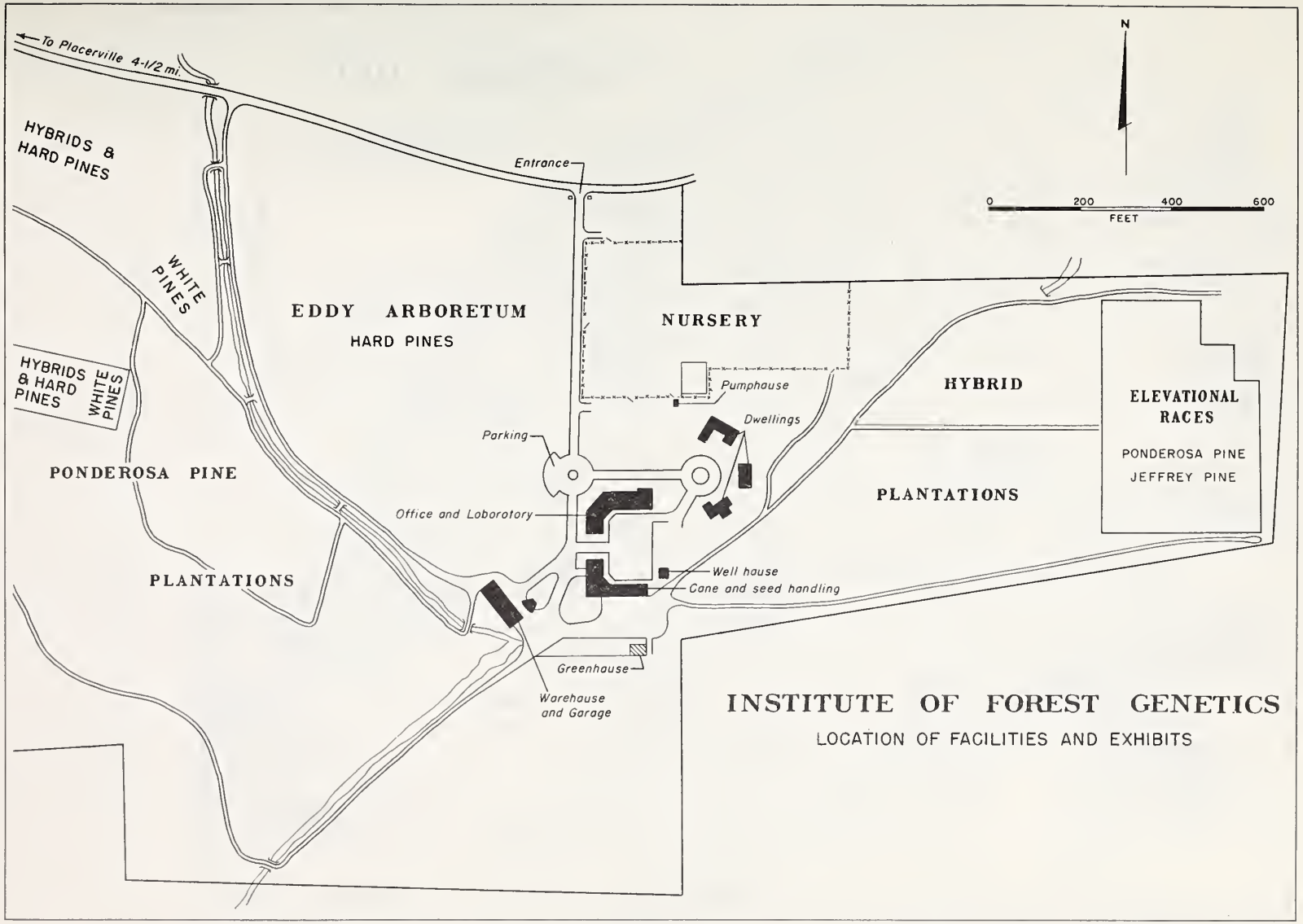
P. parviflora Sieb. & Zucc. (Japanese white)--trees probably were not taken care of as well as they should have been.

P. pinceana Gord. (Pince)--trees probably were not taken care of as well as they should have been.

P. tropicalis More--too cold.

An extension of the Eddy Arboretum for the establishment and maintenance of high elevation, cold climate species which do not do well at the Institute of Forest Genetics is under development at an elevation of 5,000 feet on the Eldorado National Forest. The University of California has made available an area in Strawberry Canyon, Berkeley, for species which are not frost-hardy at the Institute. Plantings were made on both sites in 1958, but a report of species involved will be made only after establishment is assured.

2/ Weidman, R. H. Trees in The Eddy Arboretum, Institute of Forest Genetics, Placerville, California. U. S. Forest Service, Calif. Forest and Range Expt. Sta. Forest Res. Note 53. 8 pp. April 1947.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HYBRIDS & HARD PINES
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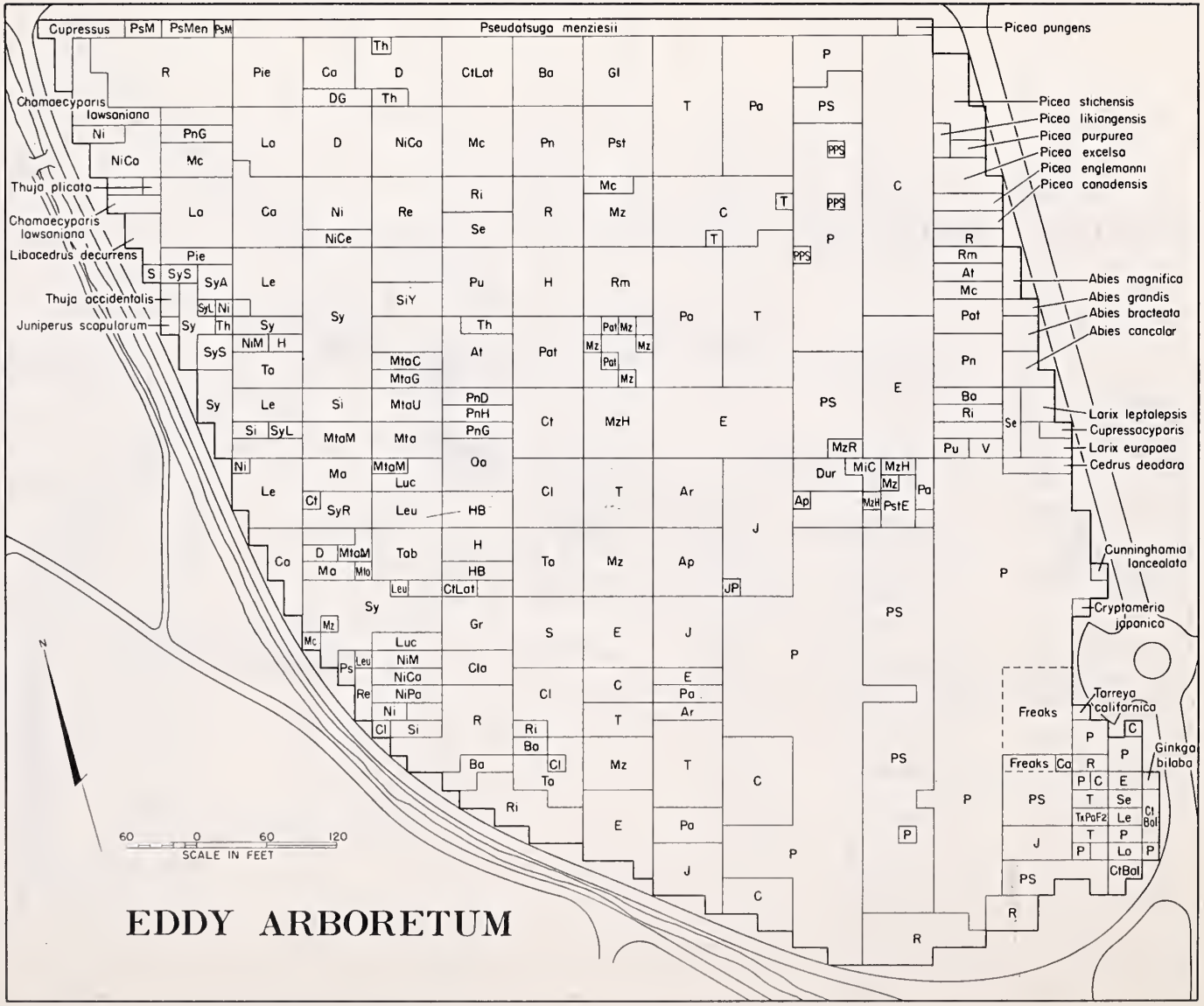
HARD PINES
NURSERY
HYBRIDS & HARD PINES
WHITE PINES
Pumphouse
HYBRID
ELEVATIONAL RACES
PONDEROSA PINE
JEFFREY PINE
Dwellings
Parking
PONDEROSA PINE
PLANTATIONS
Office and Laboratory
PLANTATIONS
Well house
Cone and seed handling
Greenhouse
Warehouse and Garage
INSTITUTE OF FOREST GENETICS
LOCATION OF FACILITIES AND EXHIBITS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Picea excelsa
Picea englemanni
Picea canadensis
Chamaecyparis lawsoniana
Thuja plicata
Chamaecyparis lawsoniana
Libocedrus decurrens
Thuja accidentalis
Juniperus scopulorum
Abies magnifica
Abies grandis
Abies bracteata
Abies concolor
Larix leptolepsis
Cupressocyparis
Larix europaea
Cedrus deodara
Cunninghamia lancealata
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Torreya californica
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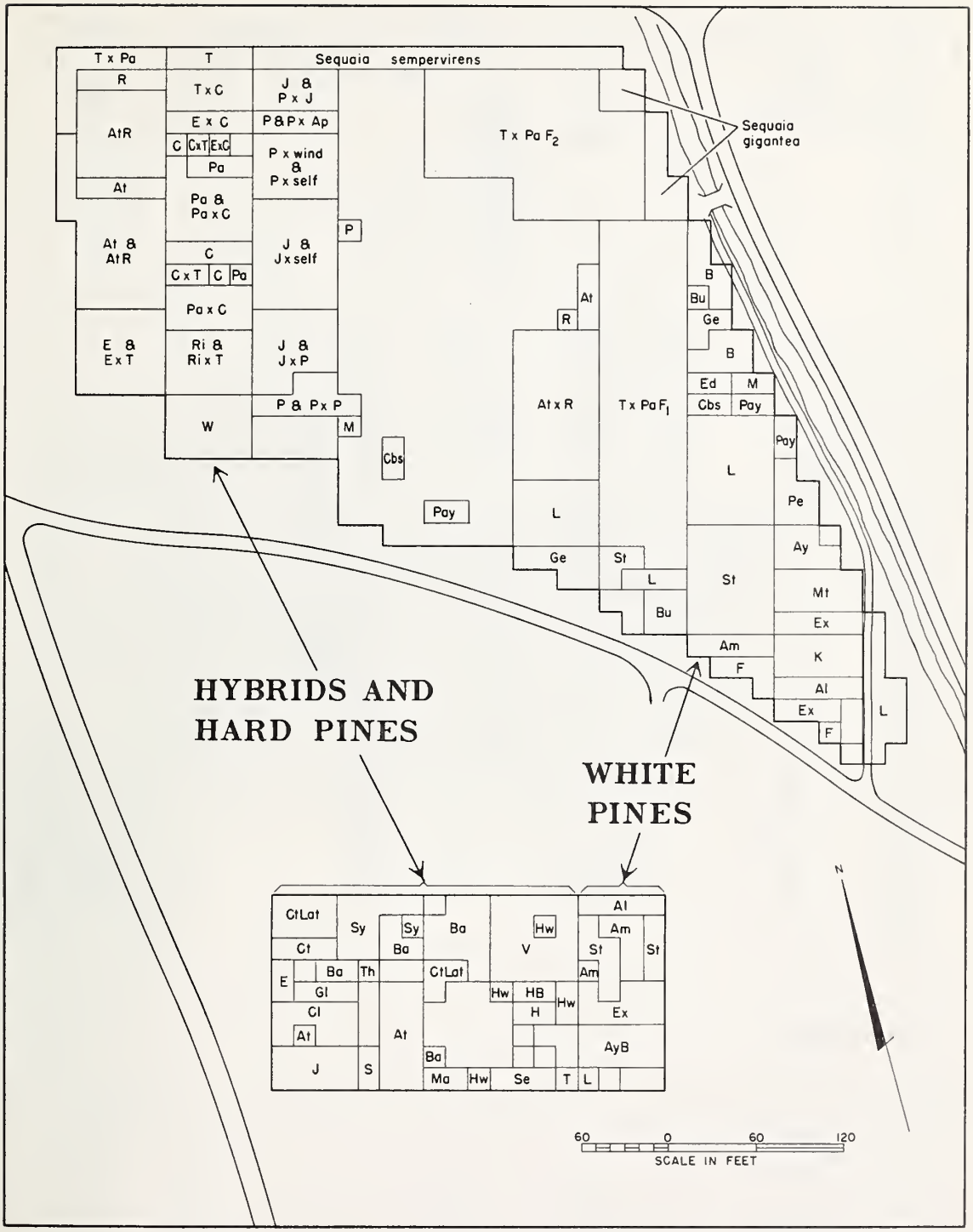
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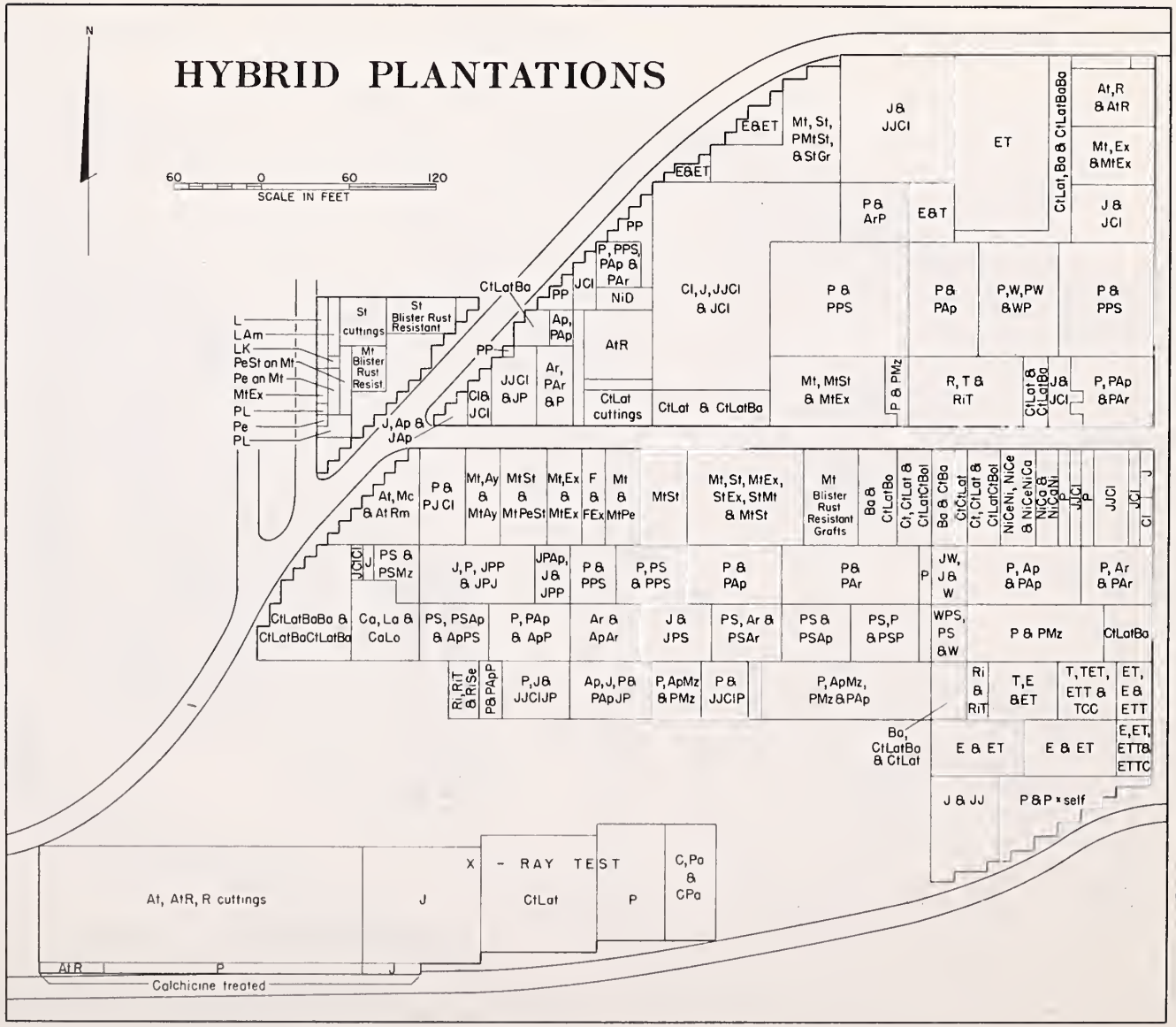
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CtLatBa
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NiD
AtR
Ap, PAp
Ar, PAr & P
JJCl & JP
Cl & JCl
J, Ap & JAp
CtLat cuttings
Cl, J, JJCl & JCl
CtLat & CtLatBa
E&ET
Mt, St, PMtSt, & StGr
J & JJCl
ET
CtLat, Ba & CtLatBaBa
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Mt, Ex & MtEx
J & JCl
P & ArP
E&T
P & PPS
P & PAp
P, W, PW & WP
P & PPS
Mt, MtSt & MtEx
P & PMz
R, T & RiT
CtLat & CtLatBa
J & JCl
P, PAp & PAr
At, Mc & At Rm
P & PJ Cl
Mt, Ay & MtAy
MtSt & MtPeSt
Mt, Ex & MtEx
F & FEx
Mt & MtPe
MtSt
Mt, St, MtEx, StEx, StMt & MtSt
Mt Blister Rust Resistant Grafts
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Cl, CtLat & CtLatClBol
Ba & ClBa
Ct, CtLat & CtLatClBol
NiCeNi, NiCe
NiCe & NiCeNiCa
NiCa & NiCaNi
JJCl
P
JJCl
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Cl
JJCl
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PS & PSMz
J, P, JPP & JPJ
JPAp, J & JPP
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JW, J & W
P, Ap & PAp
P, Ar & PAr
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Ca, La & CaLo
PS, PSAp & ApPS
P, PAp & ApP
Ar & ApAr
J & JPS
PS, Ar & PSAr
PS & PSAp
PS, P & PSP
WPS, PS & W
P & PMz
CtLatBa
Ri, RiT & RiSe
P & PApP
P, J & JJCIJP
Ap, J, P & PApJP
P, ApMz & PMz
P & JJCIP
P, ApMz, PMz & PAp
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P & P = self
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J
Colchicine treated

Scientific and common names	IFG symbol 1/	Natural distribution	Produce flowers 2/ Male	Female	Av. date
Pinus					
albicaulis Engelm. Whitebark	Al	High elevations in mountains of central British Columbia southeastward in the Rocky Mountains of northeastern Washington, Idaho, western Montana, and western Wyoming to northern Utah; and southward in the Cascade and Sierra Nevada Mountains to central California. Also in mountains of northeastern Oregon.			
armandi Franch. Armand	Am	Mountains of southern, central, and western China (Yunnan, Kweichow, Szechwan, Hupeh, Kansu, Shansi), and Taiwan (Formosa).	x		5/12
attenuata Lemm. Knobcone	At	Mountains (Cascades) of southwestern Oregon south in coastal ranges of California to San Bernardino Mountains. South in Sierra Nevada of California to Mariposa County. Northern Baja California, Mexico.	x	x	4/15

1/ Used for convenience on tree-labels, in records, and on maps.

2/ As systematic annual surveys of flower production are not made, flowering may have occurred in some species for which flower production is not indicated. Average date refers to date of pollen-shedding. Female strobili (conelets) attain maximum receptivity at about the same time.

PINES IN THE ARBORETUM

Scientific and common names	IFG symbol	Natural distribution	Produce flowers		
			Male	Female	Av. date
Pinus					
ayacahuite Ehren. Mexican white	Ay	High elevations of southern Mexico (Chiapas, Guerrero, Hidalgo, Oaxaca, Puebla, Tlaxcala, Vera Cruz, and Guatemala; rare in Honduras.	x	x	5/29
ayacahuite var. brachyptera Shaw Mexican white	AyB	Northern Mexico in the States of Chihuahua, Durango, Sinaloa, Sonora, and Zacatecas.			
balfouriana Grev. & Balf. Foxtail	B	High elevations in northwestern California (Siskiyou and Trinity Counties), and southern Sierra Nevada Mountains.			
banksiana Lamb Jack	Ba	Nova Scotia and central Quebec across Canada (Ontario, southern Manitoba, and Saskatchewan, central Alberta) to northern British Columbia and the Yukon and Mackenzie regions. In United States from Maine westward across northern New Hampshire, Vermont, New York, Michigan, Wisconsin, and northeastern Minnesota.	x	x	4/13
brutia Tenore Erectcone Aleppo	Br	Southeastern Europe, southwestern Asia.	x	x	4/20
bungeana Zucc. & Endl. Lacebark	Bu	Mountains of central and northern China (Shansi), Shensi, Hupeh, Hopei, Szechwan.	x	x	5/13

Scientific and common names	IFG symbol	Natural distribution	Produce flowers		
			Male	Female	Av. date
Pinus					
canariensis Smith Canary Island	Ca	Canary Islands, 5,000 to 7,000 feet elevation.	x	x	3/26
caribaea Mor. Caribbean	C	Bahama Islands, West Indies. Atlantic slope of northern Central America (British Honduras, northern Honduras, northeastern Nicaragua).			
cembroides Zucc. Mexican pinyon	Cbs	Mountains of southeastern Arizona, southwestern New Mexico. Widely distributed in Mexico, occurring in Aguascalientes, Baja California, Chihuahua, Coahuila, Durango, Hidalgo, Jalisco, Nuevo Leon, Puebla, Queretaro, San Luis Potosi, Sonora, Tamaulipas, Tlaxcala, and Zacatecas.	x	x	
clausa (Chapin) Vasey Sand	Cla	Florida and west to coastal Alabama.			
contorta Dougl. Some authors recognize two varieties: a coastal form P. contorta var. contorta (Shore Pine) and an inland or mountain form P. contorta var. latifolia Engelm. (Lodgepole Pine).	Ct	Has extraordinary range in latitude (±30°) and altitude (sea level to 11,000 feet). In Canada from Alberta through British Columbia and southeastern Alaska to the Yukon region. In United States, coast of Washington, Oregon, and California to Mendocino County; mountains of northern Washington south in Cascades and Sierra Nevada	x	x	5/12

Scientific and common names	IFG symbol	Natural distribution	Produce flowers Male	Female	Av. date
Pinus contorta Dougl.--cont.		and mountains of southern California to Baja California; Rocky Mountains from northwestern Washington to northeastern Utah and central Colorado; also in Black Hills of South Dakota and Wyoming, and mountains of northwestern Oregon.			
cooperi Blanco Cooper	Co	Durango, Mexico			
cooperi var. ornelasi Blanco	CoO	Durango, Mexico			
coulteri D. Don Coulter	Cl	From Mt. Diablo south in coastal and southern mountains of California to northern Baja California.	x	x	5/20
densiflora Sieb & Zucc. Low elev. Japanese red	D	Mountains of Japan from southern Kyushu to southern Hokkaido. South Korea, East China.	x	x	5/3
densiflora var. globosa Mayr. Japanese globe	DG	Japan	x	x	
durangensis Martinez Durango	Dur	Southern Chihuahua and Durango in Mexico.			
durangensis var. quinquefoliata Martinez	DurQ	Durango, Mexico			

Scientific and common names	IFG symbol	Natural distribution	Produce flowers		
			Male	Female	Av. date
Pinus					
echinata Mill Shortleaf	E	Southeastern Connecticut, southeastern New York, southern New Jersey, eastern Pennsylvania, Delaware, eastern Maryland, eastern Virginia, North Carolina, South Carolina to southern Georgia and west across Alabama, Mississippi, northern Louisiana, Arkansas to eastern Texas and Oklahoma; from northern Arkansas and southern Missouri across western Tennessee, Kentucky, southern Illinois, southern Ohio and western West Virginia to southwestern Pennsylvania.	x	x	5/1
edulis Engelm. Pinyon	Ed	Rocky Mountain regions of Utah, Colorado, Arizona, New Mexico. Trans-Pecos, Texas, extreme northwestern Oklahoma, southwestern Wyoming, southeastern California and northern Baja California.	x	x	
elliottii Engelm. Slash	El	South Atlantic and Gulf coastal plains of the United States from southern South Carolina to central Florida and southeastern Louisiana.	x	x	3/22

PINES IN THE ARBORETUM

Scientific and common names	IFG symbol	Natural distribution	Produce flowers		
			Male	Female	Av. date
Pinus					
engelmannii Carr. Apache	Ap	Mountains of southwestern New Mexico and southeastern Arizona south in Sonora, Chihuahua, Sinaloa, and Durango to Zacatecas in central Mexico. Up to 9,000 feet elevation in Mexico.	x	x	5/10
flexilis James Limber	F	Chiefly Rocky Mountain region from southeastern British Columbia and southern Alberta south in mountains of Montana, Idaho, Nevada, central Sierra Nevada and southern ranges of California east to Trans-Pecos, Texas. Local in northwestern North Dakota, Black Hills of South Dakota, western Nebraska, and northeastern Oregon. Occurs in northeastern Mexico and Nueva Leon.	x	x	5/24
flexilis var. reflexa Engelm. Border limber	F Ref	Mountains of southeastern Arizona and southwestern New Mexico and in Chihuahua and Coahuila, Mexico.			
gerardiana Wall. Gerard	Ge	Northwestern Himalaya Mountains, India, Afghanistan. Baluchistan. Reaching up to 12,000 feet.			

Scientific and common names	IFG symbol	Natural distribution	Produce flowers		
			Male	Female	Av. date
Pinus					
glabra Walt. Spruce	Gl	South Atlantic and Gulf coastal plains of United States: South Carolina to northern Florida west to southeastern Louisiana.	x	x	4/8
greggii Engelm. Gregg	Gr	Sierra Madre Oriental Mountains of Mexico: southern Coahuila and Nueva Leon, southern San Luis Potosi and eastern Hidalgo.	x	x	5/29
griffithii McCell. (Excelsa Wall.) Himalayan	Ex	6,000 to 12,500 feet elevation in the Himalaya Mountains from Nepal to Afghanistan.	x	x	5/16
halepensis Mill. Aleppo	H	Mediterranean region: Portugal to Asia Minor, Algeria and Cyprus - up to 2,000 feet in elevation.	x	x	4/18
halepensis var. pityusa Stev.&Ball Large cone Aleppo	Pt	East coast of Black Sea, Thrace Anatolia, Syria and the Islands of Prinkipo and Thasos.	x	x	
hwangshanensis Hsia	Hw	Southeastern China			
jeffreyi Grev. and Balf. Jeffrey	J	Mountains of southwestern Oregon, southeastward along the Cascade, Sierra Nevada, San Bernardino and San Jacinto Mountains to northern Baja California. Occurs also in Mendocino County, California and in the San Benito Mountains of California.	x	x	5/29

PINES IN THE ARBORETUM

Scientific and common names	IFG symbol	Natural distribution	Produce flowers		
			Male	Female	Av. date
Pinus					
koraiensis Sieb. and Zucc. Korean	K	Amurland, Manchuria, Korea, and local on several mountains of central Japan.			
kwangtungensis	Kw	Southern China, in the mountains of Kwangtung, Kwangsi, Hunan proveniences and the island of Hainan.			
lambertiana Dougl. Sugar	L	Mountains of western Oregon, south in coastal ranges, Sierra Nevada and mountains of southern California to northern Baja California.	x	x	6/1
leiophylla Sehl. & Cham. Smoothleaf	Le	In Mexico from Sonora and Chihuahua to Oaxaca: occurs in Chihuahua, Durango, Jalisco, Mexico, Michoacan, Morelos, Nayarit, Oaxaca, Puebla, Tlaxcala, Valle de Mexico, Vera Cruz, Zacatecas.	x	x	5/20
leiophylla var. chihuahuana Engelm. Chihuahua	LeC	Mountains of southwestern New Mexico and central and southeastern Arizona, and in northern Mexico (Sonora, and Chihuahua south to Durango, Nayarit, Jalisco, and Zacatecas.			

Scientific and common names	IFG symbol	Natural distribution	Produce flowers		
			Male	Female	Av. date
Pinus					
leucodermis Antoine Greybark	Leu	Balkan Peninsula (Bosnia, Hercegovina, Montenegro) and southern Italy. Elevation 4,000 to 5,000 feet.	x	x	5/24
luchuensis Mayr. Luchu	Luc	Ryukyu Islands. (Okinawa)	x		4/12
lumholtzii Rob. & Fern. Lumholtz	Lum	Central Mexico in the states of Aguascalientes, Chihuahua, Durango, Guanajuato, Jalisco, Nayarit, Sinaloa, and Zacatecas.			
massoniana Lamb. Masson: Chinese red	Ma	Southeastern China and along Yangtse River into Szechwan.	x	x	4/12
michoacana var. cornuta Martinez	MiC	Widely distributed in Mexico - states of Chiapas, Durango, Guanajuato, Querrero, Hidalgo, Jalisco, Mexico, Michoacan, Morelos, Nayarit, Nuevo Leon, Oaxaca, Puebla, Vera Cruz, Zacatecas.			
monophylla Torr. & Frem. Singleleaf pinyon	M	Mountains of the Great Basin Region from southern Idaho south to central and east central Arizona and southwest across Nevada to southern California and northern Baja California.	x	x	6/2

PINES IN THE ARBORETUM

Scientific and common names	IFG symbol	Natural distribution	Produce flowers		
			Male	Female	Av. date
Pinus					
montana Mill. Swiss mountain	Mta	Mountains of southern Europe: central Spain to Balkan Mountains.	x	x	5/16
montana var. compacta D.Hill Dwarf mugo	MtaC	Alps to mountains of central Europe and the Balkan Peninsula.	x	x	
montana var. gallica French mountain	MtaG	Mountains of southeastern France.	x	x	5/16
montana var. mughus Willk. Mugo	MtaM	Eastern Alps and mountains of the Balkan states.	x	x	5/16
montana var. uncinata Willk. Large Swiss	MtaU	Pyrenees to western Alps.	x	x	5/14
montezumae Lamb. Montezuma	Mz	Widely distributed in all climatic zones of Mexico. Reported in states of Chiapas, Coahuila, Guerrero, Hidalgo, Jalisco, Mexico, Michoacan, Morelos, Puebla, Tlaxcala, Valle de Mexico, Vera Cruz.	x	x	4/28
montezumae var. hartwegii Lind.	MzH	Cold areas of Mexico, usually at elevations of 10,000 to 12,000 feet. Reported in states of Coahuila, Hidalgo, Tlaxcala and Valle de Mexico.			

Scientific and common names	IFG symbol	Natural distribution	Produce flowers		
			Male	Female	Av. date
Pinus montezumae var. rudis Endl.	MzR	Widely distributed in cool areas of Mexico, usually at elevations of 8,000 to 9,000 feet. Reported in states of Coahuila, Hidalgo, Jalisco, Mexico, Michoacan, Nayarit, Nuevo Leon, Oaxaca, Puebla, Tamaulipas, Valle de Mexico, Zacatecas. Also found in Guatemala.			
monticola Dougl. Western white	Mt	Southwestern Alberta to western Montana and northern Idaho, and southern British Columbia south in Cascades and Sierra Nevada mountains to central California.	x	x	5/22
muricata D. Don. Bishop	Mc	A narrow, highly discontinuous strip along the coast from vicinity of Trinidad Head in Humboldt County to La Purissima in Santa Barbara County thence southward in insular California to Guadalupe and Cedros Islands and again on the mainland of Baja California at Pt. San Quentin where it has been described as var. Anthonyi Lem.	x	x	4/20

PINES IN THE ARBORETUM

Scientific and common names	IFG symbol	Natural distribution	Produce flowers		
			Male	Female	Av. date
Pinus					
Nelsoni shaw Nelson	Ne	Limited distribution in northeastern Mexico, occurring on lower slopes (elevation about 7,000 feet) of mountains in Coahuila, Nueva Leon, San Luis Potosi, and Tamaulipas.			
nigra Arnold Austrian	Ni	Mountains of central and southeastern Europe. Very variable species.	x	x	5/9
nigra var. calabrica Schneid Corsican	NiCa	Southern Europe.	x	x	5/19
nigra var. cebennensis Rehder Cevennes	NiCe	Pyrenees Mountains, and Cevennes Mountains in southeastern France.	x	x	5/26
nigra var. mauritanica Mair & Peyer Algerian	NiM	Djurdjura, Algeria, Africa.	x	x	
nigra var. pallasiana Ascher.& Graeb. Crimean	NiPa	Asia Minor, Crimean region.	x	x	
nigra var. salzmannii Dun.	NiS	Pyrenees Mountains, Spain			

Scientific and common names	IFG symbol	Natural distribution	Produce flowers		
			Male	Female	Av. date
Pinus					
oocarpa Schiede Eggcone	Oo	Widely distributed in Mexico, occurring in Chiapas, Chihuahua, Durango, Guerrero, Jalisco, Mexico, Michoacan, Morelos, Nayarit, Oaxaca, Puebla, Sinaloa, Sonora, and Zacatecas, and in Guatemala, Honduras and Nicaragua. (Grows farther south than any other pine in New World, excepting, perhaps P. caribaea.)			
palustris Mill. Longleaf	Pa	Southern Atlantic and Gulf coastal plains of United States, Virginia to central Florida to east Texas.		x	
parviflora Sieb. & Zucc. Japanese white	Pav	Mountains of Japan from Shikoku Island northeastward to Hidaka Mountains of Hokkaido.			
parviflora var. pentaphylla Japanese white	PavP	Japanese islands of Hokkaido and Honshu.			
patula Schl. & Cham. Mexican weeping	Pat	Warm-temperate regions of eastern and central Mexico - in Hidalgo, Mexico, Puebla, Queretaro, Valle de Mexico, and Vera Cruz. Occurring up to 9,000 feet.	x	x	4/15
peuce Griseb. Macedonian	Pe	Mountains of the Balkan Peninsula: Yugoslavia, Macedonia, Bulgaria, and Greece. 5,000 to 6,000 feet.			

PINES IN THE ARBORETUM

Scientific and common names	IFG symbol	Natural distribution	Produce flowers		
			Male	Female	Av. date
Pinus					
pinaster Ait. Maritime	Pn	Coastal regions of western Mediterranean (Portugal, Spain, and Atlas Mountains of Morocco and Algeria); eastward in Europe to Yugoslavia, Greece, and Turkey where it occurs up to 2,800 feet elevation.	x	x	4/16
pinaster var. des landes	PnD	Southwestern France.	x	x	4/1
pinaster var. gigantea	PnG	Mediterranean Region.	x	x	4/17
pinaster var. hamiltonii Gord. Lord Aberdeen	PnH	Mountains near Nice, France.	x	x	4/30
pinea L. Italian stone	Pie	Mediterranean Region from Portugal to Asia Minor. Not commonly found above 2,000 feet.	x	x	5/14
ponderosa Laws. Ponderosa	P	Widely distributed in western North America from British Columbia south in Cascades and Coastal Mountains to central California, and in Sierra Nevada to mountains of southern California and northern Baja California; southwest from British Columbia in Rocky Mountains to southeastern Arizona, Trans-Pecos Texas and in Sonora and Chihuahua to Durango, Mexico; southwestern North Dakota, and western South Dakota; Nebraska.	x	x	5/1

Scientific and common names	IFG symbol	Natural distribution	Produce flowers		
			Male	Female	Av. date
Pinus					
ponderosa var. arizonica (Engelm.) Shaw Arizona	Ar	Mountains of extreme southeastern Arizona and southwestern New Mexico and northern Mexico (Sonora, Chihuahua, Durango, Nuevo Leon, and Tamaulipas.)	x	x	4/28
ponderosa var. arizonica stormiae	ArS	Northeastern Mexico in the states of Coahuila and Nuevo Leon.			
ponderosa var. scopulorum Engelm. Rocky Mountain ponderosa	PS	Eastern Nevada, Utah, western Colorado and east of the Continental Divide.	x	x	4/27
pseudostrobus Lindl. False Weymouth	Pst	Widely distributed in Mexico (states of Chiapas, Jalisco, Mexico, Michoacan, Nuevo Leon, Puebla, Tamaulipas, Valle de Mexico) and extending south to Guatemala, Honduras, and Nicaragua, up to 10,000 feet elevation.			
pseudostrobus var. estevezi Martinez	PstE	Northeastern Mexico in the states of Coahuila and Nuevo Leon.			
pseudostrobus var. protuberans Martinez	PstP	Central Mexico in the states of Mexico, Michoacan and Valle de Mexico.			

PINES IN THE ARBORETUM

Scientific and common names	IFG symbol	Natural distribution	Produce flowers		
			Male	Female	Av. date
Pinus					
pungens Lamb. Table Mountain	Pu	Mountains of central Pennsylvania southwest in western Maryland, Virginia, North Carolina, South Carolina, and eastern West Virginia, Kentucky, Tennessee to northern Georgia. Local in New Jersey.	x	x	4/10
quadrifolia Parl. Parry pinyon	Pay	Local in Riverside and San Diego counties, California, and in northern Baja California.	x	x	6/9
radiata D. Don Monterey	R	Coast of central California (Santa Cruz, Monterey, and San Luis Obispo counties) and Santa Cruz Islands, Santa Rosa Islands, and Guadalupe Island off coast of Baja California.	x	x	3/3
resinosa Red	Re	Newfoundland and Quebec south to southeastern Pennsylvania northwest across Pennsylvania northwest tip of Ohio; northern Michigan; Wisconsin, eastern and northern Minnesota to southeastern Manitoba and east to Ontario; local in West Virginia.	x	x	4/25

Scientific and common names	IFG symbol	Natural distribution	Produce flowers		
			Male	Female	Av. date
Pinus rigida Mill. Pitch	Ri	Central Maine to northern coast of Georgia including New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, North Carolina, South Carolina, and eastern parts of Tennessee, Kentucky, and Ohio.	x	x	4/21
roxburghii Sarg. Chir	Lo	Himalaya Mountains from Bhutan to Afghanistan. Mostly in foothills but extends up to 7,000 feet.	x	x	3/29
sabiniana Dougl. Digger	S	Lower slopes of mountains surrounding Central Valley of California.	x	x	4/24
serotina Michx. Pond	Se	Atlantic and Gulf Coastal Plains of the United States from southern New Jersey to northern Florida and northwest to western Florida and central Alabama.	x	x	4/22
sinensis Lamb. (tabulaeformis Carr.) Chinese	Si	Sub-alpine elevations in mountains of central and western China and at lower levels in northern China and Korea. (Very variable.)	x	x	4/26
strobus L. Eastern white	St	From Newfoundland and Gaspe' Peninsula of Quebec south to northern Georgia, and west to southeastern Manitoba; south to southeastern Minnesota and eastern Iowa and east to northeastern Ohio.	x	x	5/16

Scientific and common names	IFG symbol	Natural distribution	Produce flowers		
			Male	Female	Av. date
Pinus strobus var. chiapensis Martinez	StC	Southern Mexican states of Chiapas, Guerrero, Oaxaca, Puebla, and Vera Cruz. Also found in Guatemala where it forms extensive forests.			
sylvestris L. Scotch	Sy	Most widely distributed pine. Scotland, throughout Europe and western and northern Asia.	x	x	5/4
sylvestris var. argentea Steven. Silver Scotch	SyA	Caucasus Mountains.	x	x	5/3
sylvestris var. lapponica Fries Lapland	SyL	Northern Europe, Lapland	x	x	
sylvestris var. rigensis Loud. Riga	SyR	Vicinity of Riga in Latvia.	x	x	5/2
tabulaeformis Carr. (sinensis Lamb.) Chinese	Tab	Northern to central and western China. (Very variable.)	x	x	4/24
taeda L. Loblolly	T	Atlantic coastal plain and Piedmont from southern New Jersey to central Florida and west to eastern Texas, southeastern Oklahoma, southeastern Arkansas, and southern Tennessee.	x	x	4/5
taiwanensis Hayata Formosa	Ta	Formosa		x	4/28

Scientific and common names	IFG symbol	Natural distribution	Produce flowers		
			Male	Female	Av. date
Pinus					
teocote Schl. & Cham. Aztec	Te	Probably the most widely distributed pine in Mexico. Not reported in states of Aguascalientes, Baja California, and Chihuahua.			
thunbergi Parl. Japanese black	Th	A maritime species, growing in Japan and the islands of Quelpart and Ooryŏng off the coast of Korea.	x	x	4/19
torreyana Parry Torrey	To	Small area on coast north of San Diego, California and on Santa Rosa Island.	x	x	3/17
virginiana Mill. Virginia, Scrub	V	Southeastern New York southwest to southeastern Illinois, south to central Alabama, and east to northern part of the Georgia coast.	x	x	4/23
washoensis Mason & Stockwell Washoe	W	High elevations in southwestern Washoe County, Nevada. (Mt. Rose, north of Lake Tahoe.)		x	
yunnanensis Franch. Yunnan	SiY	Southwestern China (Yunnan and Szechwan).	x	x	4/19

PINE HYBRIDS IN THE ARBORETUM

Scientific and common names	IFG symbol	Produce flowers		
		Male	Female	Av. date
Pinus:				
X attenuradiata Knobcone x Monterey	AtR	x	x	3/30
X attenuradiata x X attenuradiata (Knobcone x Monterey) x (Knobcone x Monterey)	AtR_{F_2}	x	x	3/30
X attenuradiata x attenuata (Knobcone x Monterey) x knobcone	AtR,At			
X attenuradiata x radiata (Knobcone x Monterey) x Monterey	AtR,R			
attenuata x X attenuradiata Knobcone x (knobcone x Monterey)	At,AtR	x	x	4/21
attenuata x muricata (Santa Cruz variant of P. muricata) Knobcone x Bishop	AtMc	x	x	3/27
canariensis x roxburghii Canary x chir	CaLo	x		
contorta x banksiana Shore x jack	CtBa	x	x	
contorta x contorta var. murrayana Shore x lodgepole	CtMy	x	x	
echinata x elliottii Shortleaf x slash	EC	x	x	4/3
echinata x (echinata x elliottii) Shortleaf x (shortleaf x slash)	E,EC			
echinata x rigida Shortleaf x pitch	ERi	x	x	

PINE HYBRIDS IN THE ARBORETUM

Scientific and common names	IFG symbol	Produce flowers Male	Female	Av. date
Pinus:				
echinata x taeda Shortleaf x loblolly	ET	x	x	4/18
(echinata x taeda) x (echinata x elliottii) (Shortleaf x loblolly) x (shortleaf x slash)	ET,EC		x	
(echinata x taeda) x (rigida x taeda) (Shortleaf x loblolly) x (pitch x loblolly)	ET,RiT		x	
(echinata x taeda) x taeda (Shortleaf x loblolly) x loblolly	ET,T			
(echinata x taeda) x (taeda x elliottii) (Shortleaf x loblolly) x (loblolly x slash)	ET,TC			
elliottii x palustris Slash x longleaf	CPa			
elliottii x taeda Slash x loblolly	CT	x	x	
engelmannii x (jeffreyi x ponderosa) Apache x (Jeffrey x ponderosa)	Ap,JP			
engelmannii x montezumae Apache x Montezuma	ApMz			
engelmannii x ponderosa Apache x ponderosa	ApP			
engelmannii x ponderosa var. arizonica Apache x Arizona	ApAr		x	
engelmannii x ponderosa var. scopulorum Apache x Rocky Mt. ponderosa	ApPS			

PINE HYBRIDS IN THE ARBORETUM

Scientific and common names	IFG symbol	Produce flowers Male	Female	Av. date
Pinus:				
flexilis x griffithii Limber x Himalayan	FEx	x	x	5/24
jeffreyi x coulteri Jeffrey x Coulter	JCl	x	x	
jeffreyi x (jeffreyi x coulteri--natural hybrid) Jeffrey x (Jeffrey x Coulter--natural hybrid)	J,JCl	x	x	
(jeffreyi x coulteri--natural) x wind (Jeffrey x coulter--natural) x wind		x	x	
(jeffreyi x coulteri--natural) x coulteri (Jeffrey x Coulter--natural) x Coulter	JCl,Cl			
[jeffreyi x (jeffreyi x coulteri--natural)] x (jeffreyi x ponderosa) [Jeffrey x (Jeffrey x Coulter--natural)] x (Jeffrey x ponderosa)	JJCl,JP			
[jeffreyi x (jeffreyi x coulteri--natural)] x ponderosa [jeffrey x (Jeffrey x Coulter--natural)] x ponderosa	JJCl,P			
jeffreyi x montezumae Jeffrey x Montezuma	JMz			
jeffreyi x ponderosa Jeffrey x ponderosa	JP	x	x	
jeffreyi x ponderosa var. scopulorum Jeffrey x Rocky Mt. ponderosa	JPS		x	

PINE HYBRIDS IN THE ARBORETUM

Scientific and common names	IFG symbol	Produce flowers		
		Male	Female	Av. date
Pinus:				
(jeffreyi x ponderosa) x engelmannii (Jeffrey x ponderosa) x Apache	JP,Ap			x
(jeffreyi x ponderosa) x jeffreyi (Jeffrey x ponderosa) x Jeffrey	JP,J			x
(jeffreyi x ponderosa) x ponderosa (Jeffrey x ponderosa) x ponderosa	JP,P			
jeffrey x washoensis Jeffrey x Washoe	JW			
lambertiana x armandi Sugar x Armand	LAm			
lambertiana x Koraiensis Sugar x Korean	LK			
monticola x ayacahuite Western white x Mexican white	MtAy			
monticola x flexilis Western white x limber	MtF			
monticola x griffithii Western white x Himalayan	MtEx	x		x
monticola x peuce Western white x Macedonian	MtPe			x
monticola x (peuce x strobus) Western white x (Macedonian x eastern white)	Mt,PeSt			x
monticola x strobus Western white x eastern white	MtSt	x		x

PINE HYBRIDS IN THE ARBORETUM

Scientific and common names	IFG symbol	Produce flowers		
		Male	Female	Av. date
Pinus:				
X murraybanksiana Lodgepole x jack	MyBa	x	x	4/23
X murraybanksiana x banksiana (Lodgepole x jack) x jack	MyBa,Ba	x	x	
X murraybanksiana x wind (assumed to be X murraybanksiana) (Lodgepole x jack) x Lodgepole x jack-assumed)	$MyBa_{F_2}$	x	x	
nigra x densiflora Austrian x Japanese red	NiD			
nigra x resinosa Austrian x red	NiRe			
nigra var. calabrica x nigra Corsican x Austrian	NiCa,Ni	x	x	
nigra var. calabrica x resinosa Corsican x red	NiCa,Re			
nigra var. calabrica x thunbergi Corsican x Japanese black	NiCa,Th		x	
nigra var. cebennensis x nigra Cevennes x Austrian	NiCe,Ni	x	x	
nigra var. cebennensis x nigra var. calabrica Cevennes x Corsican	NiCe,NiCa	x	x	
palustris x elliottii Longleaf x slash	PaC			
patula x greggi Mexican weeping x Gregg	PatGr			

PINE HYBRIDS IN THE ARBORETUM

Scientific and common names	IFG symbol	Produce flowers		
		Male	Female	Av. date
Pinus:				
ponderosa x engelmannii Ponderosa x Apache	PAp	x	x	5/20
(ponderosa x engelmannii) x engelmannii (Ponderosa x Apache) x Apache	PAp,Ap			
(ponderosa x engelmannii) x (jeffreyi x ponderosa) (Ponderosa x Apache) x (Jeffrey x ponderosa)	PAp,JP			
(ponderosa x engelmannii) x montezumae (Ponderosa x Apache) x Montezuma	PAp,Mz		x	
(ponderosa x engelmannii) x ponderosa (Ponderosa x Apache) x ponderosa	PAp,P			
(ponderosa x engelmannii) x ponderosa var. arizonica (Ponderosa x Apache) x Arizona	PAp,Ar			
ponderosa x jeffreyi Ponderosa x Jeffrey	PJ			
ponderosa x (jeffreyi x coulteri-natural) Ponderosa x (Jeffrey x Coulter)	P,JCl			
ponderosa x montezumae Ponderosa x Montezuma	PMz			
ponderosa x ponderosa var. arizonica Ponderosa x Arizona	PAr			
ponderosa x ponderosa var. scopulorum Ponderosa x Rocky Mountain ponderosa	PPS			

PINE HYBRIDS IN THE ARBORETUM

Scientific and common names	IFG symbol	Produce flowers		
		Male	Female	Av. date
Pinus:				
ponderosa x washoensis Ponderosa x Washoe	PW			
ponderosa var. arizonica x ponderosa Arizona x ponderosa	ArP			
ponderosa var. scopulorum x engelmannii Rocky Mountain ponderosa x Apache	PSAp			
ponderosa var. scopulorum x montezumae Rocky Mountain ponderosa x Montezuma	PSMz			
ponderosa var. scopulorum x ponderosa Rocky Mountain ponderosa x ponderosa	PS,P			
ponderosa var. scopulorum x ponderosa var. arizonica Rocky Mountain ponderosa x Arizona	PSAr			
pungens x echinata Table Mountain x shortleaf	PuE			
pungens x rigida Table Mountain x pitch	PuRi			
rigida x echinata Pitch x shortleaf	RiE			
rigida x serotina Pitch x pond	RiSe		x	
rigida x taeda Pitch x loblolly	RiT	x	x	4/11

PINE HYBRIDS IN THE ARBORETUM

Scientific and common names	IFG symbol	Produce flowers		
		Male	Female	Av. date
Pinus:				
(rigida x taeda) x (echinata x taeda) (Pitch x loblolly) x (shortleaf x loblolly)	RiT,ET			
(rigida x taeda) x glabra (Pitch x loblolly) x spruce	RiT,Gl			
X sondereggeri - natural Longleaf x loblolly	Son	x	x	3/22
strobus x griffithii Eastern white x Himalayan	StEx	x	x	5/11
strobus x monticola Eastern white x western white	StMt	x	x	
taeda x elliottii Loblolly x slash	TC	x	x	4/3
taeda x (echinata x taeda) Loblolly x (shortleaf x loblolly)	T,ET			
(taeda x elliottii) x elliottii (Loblolly x slash) x slash	TC,C			
virginiana x clausa Virginia x sand	VCla			
washoensis x ponderosa Washoe x ponderosa	WP		x	
washoensis x ponderosa var. scopulorum Washoe x Rocky Mountain ponderosa	WPS			

TAXADS AND CONIFERS OTHER THAN PINES GROWING IN THE

EDDY ARBORETUM, 1957

Scientific and common names	Native range
Abies concolor (Gord. & Glend.) Hoopes White fir	Western North America
Abies grandis (Dougl.) Lindl. Grand fir	Western North America
Abies magnifica A. Murr. Red fir	California and Oregon
Abies religiosa Schl. & Cham. Sacred fir	Mexico and Guatemala
Abies venusta (Dougl.) K. Koch Bristlecone fir, Santa Lucia fir	Santa Lucia Mountains, California
Cedrus deodara Loud. Deodar cedar	Himalaya Mountains
Chamaecyparis lawsoniana (A. Murr.) Parl. Port-Orford-cedar	Southwest Oregon to northwest California
Cryptomeria japonica D. Don Cryptomeria	Japan
Cunninghamia lanceolata Hook. Chinese fir	China
X Cupressocyparis Leylandii Dallim. and Jacks. Leyland cypress (Chamaecyparis nootkatensis x Cupressus macrocarpa)--natural hybrid (possibly a mutant)	Received from Winchester, England
Cupressus arizonica var. bonita Lemm. Arizona cypress	Arizona
Cupressus Goveniana Gord. Gowen cypress	California

TAXADS AND CONIFERS OTHER THAN PINES GROWING IN THE

EDDY ARBORETUM, 1957

Scientific and common names	Native range
Cupressus guadalupensis S. Watson Guadalupe cypress	Mexico
Cupressus lusitanica Mill. Mexican cypress	Mexico and Guatemala
Cupressus macnabiana A. Murr. McNab cypress	Oregon and California
Cupressus nevadensis Abrams. Piute cypress	California
Cupressus sargentii Jeps. Sargent cypress	California
Cupressus sempervirens L. Italian cypress	Mediterranean Region
Ginkgo biloba Kaempfer Ginkgo	China
Juniperus cedrus Webb & Barth. Canary Island juniper	Canary Islands
Juniperus chinensis var. japonica Lav. Japanese juniper	Japan
Juniperus chinensis var. pfitzeriana Spaeth Pfitzer juniper	Horticultural variety
Juniperus horizontalis Moench. Creeping juniper	Northern North America
Juniperus occidentalis Hook. Western juniper	California to British Columbia
Juniperus sabina L. Savin juniper	Europe
Juniperus scopulorum Sarg. Rocky Mountain juniper	Rocky Mountains

TAXADS AND CONIFERS OTHER THAN PINES GROWING IN THE

EDDY ARBORETUM, 1957

Scientific and common names	Native range
Juniperus virginiana L. Eastern redcedar	Eastern North America
Larix europaea De Candolle (L. decidua Mill.) European larch	Europe and Siberia
Larix leptolepis Sieb. and Zucc. (L. Kaempferi Sarg.) Japanese larch	Japan
Libocedrus decurrens Torr. Incense-cedar	California and Oregon
Metasequoia glyptostroboides Hu and Cheng Dawn redwood	China
Picea canadensis (Mill.) B.S.P. (P. glauca Voss) White spruce	Northern North America
Picea Engelmanni Parry Engelmann spruce	Western North America
Picea excelsa Link. (p. abies Karst) Norway spruce	Northern Europe
Picea likiangensis Pritzel Likiang spruce	Western China
Picea mariana (Mill.) B.S.P. Black spruce	Northern North America
Picea pungens Engelm. Blue spruce	Colorado to Mexico
Picea purpurea Mast. (erroneously labeled Picea Delavayi) Purple cone spruce	Western China
Picea sitchensis Carr. Sitka spruce	Northern California to Alaska

TAXADS AND CONIFERS OTHER THAN PINES GROWING IN THE

EDDY ARBORETUM, 1957

Scientific and common names	Native range
Pseudotsuga macrocarpa (Vasey)Mary. Bigcone Douglas-fir	Southern California
Pseudotsuga menziesii (Mirb.)Franco Douglas-fir	British Columbia to Mexico
Pseudotsuga menziesii var. glauca (Beisen)Franco Rocky Mountain Douglas-fir	Rocky Mountains
Pseudotsuga Wilsoniana Hayata	Formosa
Sciadopitys verticillata Sieb. and Zucc. Umbrella pine	Japan
Sequoia gigantea Decaisne Giant Sequoia	California
Sequoia sempervirens Endl. Redwood	California
Taxus brevifolia Nutt. Pacific yew	Western North America
Taxus baccata var. fastigiata Loud. Irish yew	Europe
Thuja occidentalis L. Northern white-cedar	Eastern North America
Thuja orientalis L. Oriental arborvitae	Northeast China and Korea
Thuja plicata D. Don Western redcedar	California to Alaska
Torreya californica Torr. California torreya	California

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APPENDIX A

CLIMATOLOGICAL DATA--EDDY ARBORETUM, INSTITUTE OF FOREST GENETICS

Except for temperature data, the climatological data which follow are for the period 1929-1957 inclusive; temperature data for the period 1938-1943 inclusive are missing.

Significant Averages

Annual temperature	57.2° F.
Daily maximum temperatures	67.6° F.
Daily maximum temperature for July	88.7° F.
Daily minimum temperature	46.7° F.
Daily minimum temperature for January and February	33.9 and 35.4° F.
Date of first fall min. of 32° or lower	Oct. 18, 1949
Date of last spring min. of 32° or lower	May 10, 1933
Number of days between dates of 32° or lower	240 days
Annual precipitation (for period July 1929-July 1957)	39.07 inches
Annual snowfall	19.9 inches
Annual evaporation (for years 1949 to 1957 inclusive)	61.27 "
Daily evaporation	0.167 "
Wind speed 18 feet above ground (for years 1949 to 1957 inclusove)	3.51 M.P.H.

Highest Temperatures

	Annual		Monthly		
	°F.	Year	°F.	Year	Month
Average maximum	70.4	1934	96.0	1931	July
Average minimum	50.1	1934	70.3	1931	July
Average	60.3	1934	83.2	1931	July
Highest temperature of record	107.4	July 29, 1936			

Lowest Temperatures

	Annual °F.	Annual Year	Monthly °F.	Monthly Year	Monthly Month
Average maximum	64.4	1948	38.3	1937	Jan.
Average minimum	44.4	1948	25.0	1937	Jan.
Average	54.4	1948	31.7	1937	Jan.

Lowest temperature of record 11.7° F. January 20, 1937.

Early Fall and Late Spring Freezing Temperatures

Earliest date of a 32° temperature in the fall	October 18, 1949
Latest date of a 32° temperature in the spring	May 10, 1933
Shortest period between a spring and fall temp. of 32°	189 days 1930
Longest period between a spring and fall temp. of 32°	328 days 1943

Precipitation

Greatest annual	56.88 inches, Season 1950-51
Least annual	23.38 inches, Season 1930-31
Greatest monthly	16.15 inches, January 1940
Least monthly	0.00 inches, June, July, and Aug. several years

Greatest 24 hr. period, 3.78 inches 1/21/43 (Nov. 18, 19 & 20th weekend, 1950 - 9.56 inches)

Greatest annual snowfall	59.0 inches, season 1948-49 and 1951-52
Greatest monthly snowfall	41.3 inches, January 1933
Greatest 24 hr. snowfall	16.0 inches, January 3, 1946
Greatest depth on the ground	36.0 inches, January 1937

Several seasons with no snowfall.

APPENDIX B
SOME COMMON FOREST TREES NATIVE TO THE LOCALITY OF THE INSTITUTE OF FOREST GENETICS

Scientific and common names

Abies concolor (Gord. & Glend.) Lindl.	white fir
Acer macrophyllum Pursh.	big-leaved maple
Aesculus Californica (Spach) Nutt.	California buckeye
Arbutus menziesii Pursh.	madrone
Libocedrus decurrens Torr.	incense cedar
Photinia arbutifolia Lindl.	toyon
Pinus attenuata Lemm.	knobcone pine
Pinus lambertiana Dougl.	sugar pine
Pinus ponderosa Laws.	ponderosa pine
Pinus sabiniana Dougl.	digger pine
Populus fremontii	
Pseudotsuga menziesii (Mirb.) Franco	Douglas fir
Quercus chrysolepis Liebm.	canyon live oak
Quercus douglasi Hook. & Arn.	blue oak
Quercus kelloggii Newb.	California black oak
Quercus lobata Nee	valley white oak
Quercus x moreha Kellogg	
Quercus wislizenii A. DC.	interior live oak
Rhamnus purshiana DC.	coffee berry
Sambuscus glauca Nutt.	elderberry (blue)